Claims

1. An optical waveguide made of porous glass, wherein at least a portion of the pores of the porous glass are filled with a material which affects the propagation of light within the waveguide.

2. An optical waveguide according to claim 1, wherein said material which affects the propagation of light is a material which exhibits optical activity, or a Faraday effect.

3. An optical waveguide according to claim 1, wherein said material is an electro-optical material.

4. An optical waveguide according to claim 3, wherein said electro-optical material is a polymer.

5. An optical waveguide according to claim 1, wherein said optical waveguide is an optical fibre.

6. An optical waveguide apparatus comprising:
an optical waveguide made of porous glass, where the pores of the porous glass are filled with an electro-optical material; and
at least one pair of electrodes on opposed sides of the optical waveguide in order to induce a change in the index of refraction of the optical waveguide upon application of an electric field between the electrodes.

7. An optical waveguide apparatus according to claim 6, wherein said optical waveguide is an optical fibre.

8. An optical waveguide apparatus according to claim 6, wherein said electrodes are obtained by depositing on or in a portion of the cladding a metallic substance.

9. An optical waveguide apparatus according to claim 6, wherein said apparatus comprises two pairs of electrodes, disposed perpendicularly to each other.

10. An optical waveguide according to claim 1, wherein said optical fibre has two opposite ends, the pores at the opposite ends being filled with silica.

11. An optical waveguide according to claim 1, wherein said optical waveguide further includes a Bragg grating.

12. An optical waveguide according to claim 1, wherein said material has an index of refraction substantially equal to the index of refraction of the porous glass.

13. An optical waveguide according to claim 1, wherein said material has an index of refraction which is different from the index of refraction of the porous glass.

14. An optical waveguide according to claim 4, wherein said polymer includes dextrogyre and levogyre polymers, axially alternately and periodically filling the pores of the waveguide.

15. An optical waveguide according to claim 1, wherein said waveguide has a symmetry which is not circular.

16. An optical waveguide according to claim 1, wherein said waveguide is monomode.

17. An optical waveguide according to claim 1, wherein said waveguide is multimode.

18. A method for making an optical waveguide made of porous glass where the pores are filled with a material which affects the propagation of light within the waveguide, comprising the steps of:
(a) providing an optical waveguide made of borosilicate;
(b) chemically attacking said waveguide in order to leave a skeleton of silica and a myriad of interconnected pores; and
(c) impregnating said pores with said material.

19. A method according to claim 18, wherein said step (a) includes the steps of:
(a1) providing a preform of borosilicate glass;
(a2) drawing the preform into an optical fibre;
(a3) cutting the optical fibre into sections of a predetermined length;
(a4) submitting one of the sections of the fibre to a separation of phase treatment; and
(a5) cooling said section of the fibre that has been submitted to a separation of phase.

20. A method according to claim 18, wherein said method further includes the steps, after step (a), of:
(aa1) covering said section of the fibre that has been submitted to a separation of phase with a photoresin layer , which is exposed and developed, leaving two areas on opposite sides of the fibre free from the photoresin;
(aa2) submitting the fibre to a chemical attack in order to make pores only in at least two opposite portions of a cladding of the fibre;
(aa3) rinsing and drying the fibre;
(aa4) forming at least one pair of electrodes in the portion of the cladding by depositing into the pores a metallic substance;

(aa5) soldering conductors to the electrodes; and

(aa6) removing the photoresin.

21. A method according to claim 18, wherein said material is a polymer, and said method includes the steps, after step (c), of:

(d) polymerising said polymer.

22. A method according to claim 18, wherein said step (b) further includes the step of leaving the extremities of the fibre pore-less, and said method further includes the steps of:

(e) making the extremities of the fibre porous; and

(f) filling the pores of the extremities of the fibre with a silica-based material.

23. A method according to claim 18, wherein said method further includes the step of:

(g) writing a Bragg grating in said optical waveguide.

24. A method according to claim 18, wherein said material exhibits a Faraday effect, and said method further includes the step of doping an external portion of the cladding of the waveguide with a material which can be magnetised.